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SIX NEW SPECIES OF GALL MIDGES (DIPTERA: CECIDOMYIIDAE) FROM *MELALEUCA* (MYRTACEAE) IN AUSTRALIA

Raymond J. Gagné, Joseph K. Balciunas, and Damien W. Burrows

(RJG) Systematic Entomology Laboratory, PSI, Agricultural Research Service, U.S. Department of Agriculture, c/o National Museum of Natural History, NHB 168, Washington, D. C. 20560, USA.; (JKB) USDA-ARS Australian Biological Control Laboratory, James Cook University, Townsville, 4811, Queensland, Australia; present address: Western Weeds Quarantine Laboratory, Agricultural Research Service, USDA, 800 Buchanan St., Albany, CA 94710, U.S.A.; (DWB) Australian Centre for Tropical Freshwater Research, Australian Biological Control Laboratory, James Cook University, Townsville, 4811, Queensland, Australia.

Abstract.—A new genus, ***Lophodiplosis*** **Gagné**, is described for five new species of gall midges from Australia associated with *Melaleuca* spp. At least two of these are candidates for biological control of the introduced pest, *Melaleuca quinquenervia,* or paperbark, in Florida. In addition, a new species of *Lasioptera* is described. The new species are: ***Lophodiplosis indentata*** and ***Lophodiplosis denticulata*** that form blister galls on leaves of *Melaleuca* spp.; ***Lophodiplosis bidentata,*** responsible for rosette bud galls on *Melaleuca* spp.; ***Lophodiplosis cornuata,*** forming trumpet-shaped leaf galls on *Melaleuca viridiflora*; ***Lophodiplosis trifida,*** an inquiline in galls of *L. indentata, L. denticulata,* and *L. bidentata*; and ***Lasioptera uncinata,*** an inquiline in galls of *L. indentata* and *L. cornuata.* Keys are given to adults of Australian genera of the supertribe Cecidomyiidi and to adults and pupae of the six species found on *Melaleuca* spp. during this study.

Key words: gall midges, Cecidomyiidae, *Melaleuca,* Australia

Melaleuca quinquenervia is one of more than 200 species of a large genus of Myrtaceae that is mostly endemic to Australia (Barlow 1988, Holliday 1989). While most *Melaleuca* species are small shrubs, *M. quinquenervia* grows into a robust tree up to 25 m high in Australia (Bodkin 1991) and up to 29 m high in Florida (Rockwood and Geary 1991). It is one of many Australian trees that are popular in plantings in tropical and subtropical regions of the world. Unfortunately, *M. quinquenervia* has become a pest in some locations in the United States. It is considered the most troublesome terrestrial weed in Florida (Florida Conservation Foundation (1993) where it was introduced in 1906 (Schmitz et al. 1991). It is a lesser pest on some Hawaiian Islands (Balciunas, unpublished). In southern Florida this plant now occupies at least 500,000 acres (Bodle et al. 1994), causing extensive environmental and economic damage (Balciunas and Center 1991). Even small trees produce a great number of seeds that in Florida, unlike in Australia, result in a thick carpet of seedlings that in a few years form dense, monospecies forests (Balciunas, personal observation). In Australia, native insects suppress the growth of saplings (Balciunas and Bur-

rows 1993). In Florida, conventional control measures, such as cutting, burning, and herbicides, have proven to be ineffective, costly, or environmentally inappropriate in managing this pest. Since 1986, a consortium of Florida and U.S. agencies has supported a U.S. Department of Agriculture project in Australia to locate, test, and export potential biological control agents to help control this weed. The faunal surveys of *M. quinquenervia,* the largest plant ever targeted for a classical biological control effort (Balciunas et al. 1994), have found more than 450 herbivorous insects associated with this tree in Australia (Balciunas et al. 1995). Included among these insects are gall midges that form or are associates of various leaf and bud galls. This paper treats six species of gall midges found associated with three kinds of galls (Figs. 1–6) on *M. quinquenervia* and some of its close allies in the *Melaleuca leucadendra* group (Blake 1968).

All six species of Cecidomyiidae are new to science and described here. Four species are gall makers and the remaining two are presumed to be inquilines or successors. The gall midges causing leaf blister and bud rosette galls show potential as biological control agents and will be investigated further. The leaf blister galls were the most commonly found in our survey and abundant from August to November with the emergence of new leaves. Heavily infested leaves may be rolled or otherwise distorted, but even small numbers of galls are a tax on the host's energy. The rosette bud galls appear to have a more deleterious effect on *Melaleuca quinquenervia* by killing branch terminals.

Methods and Materials

Surveying, collecting, and rearing for this study in Australia were done by the staff of the Australian Biological Control Laboratory under the direction of JKB and DWB. Galls were collected on members of the *Melaleuca leucadendra* complex mainly in coastal areas of Queensland between Townsville (19°28'S) and Cairns (16°54'S). Some collections were also made in the vicinity of Brisbane (27°30'S) in southern Queensland and of Cooktown (15°28'S) in northern Queensland. Plant species sampled were: *Melaleuca arcana* S.T. Blake, *M. dealbata* S.T. Blake, *M. "fluviatilis"* (Barlow 1988), *M. leucadendra* (L.) L., *M. quinquenervia* (Cav.) S.T. Blake, *M. saligna* Schauer, and *M. viridiflora* Sol. ex Gaertner. Galls from the field were either preserved in alcohol or kept in small plastic containers that were checked daily for emergence. Larvae and pupae were excised from sample galls, adults were reared and their pupal exuviae saved, and all specimens were preserved in 70% ethanol. Some larvae and adults were mounted for microscopic study in Canada balsam, using the method outlined in Gagné (1989a, 1994), some were prepared for SEM viewing. In the following descriptions, anatomical terminology of the adult stage follows McAlpine (1981) and that of the larval stage follows Gagné (1989a). Specimens used in this study are deposited in the Australian National Insect Collection, Canberra (ANIC) or the U.S. National Museum of Natural History, Smithsonian Institution, Washington, D.C. (USNM). Other abbreviations used in the text are for collectors in the lists of specimens studied: ADM = A.D. Moore; DWB = D.W. Burrows; JKB = J.K. Balciunas; RJG = R.J. Gagné.

Lophodiplosis Gagné, new genus

Adult.—Head: Eyes large, connate, eye bridge about 12 facets long; facets hexagonal, closely adjacent throughout. Vertex with short to long dorsal protuberance bearing 2–6 setae. Frons with 6–12 setae. Labella elongate-hemispherical in frontal view, the apices incurved and acute, each with 5–12 setae. Palpus 4 segmented. Antenna with 12 flagellomeres, first and second flagellomeres connate, apex of twelfth flagellomere with narrow, elongate extension. Male flagellomeres binodal, sometimes weakly so, with 1 circumfilum on ba-

sal node, 2 on distal node, circumfila separate or running into one another, the loops short to long. Female flagellomeres becoming successively slightly shorter from base to apex of antenna, nodes parallel sided or constricted near middle, necks prominent and without setulae; circumfila made up of two wavy horizontal bands connected by 2 vertical bands, closely embracing node for all or most of extent.

Thorax: Scutum with 2 lateral and 2 dorsocentral rows of setae interspersed with sparse scales. Mesanepisternum covered with scales on dorsal half to two thirds. Mesepimeron with vertical row of setae. Wing: R_5 curved apically to join C posterior to wing apex; C broken beyond juncture with R_5; Rs apparent as spur of R_5, variable in position; Cu forked; M_{3+4} present as fold. Tarsal claws curved beyond midlength, one- or two-toothed or simple; empodia almost reaching bend in claws; pulvilli about one fourth length of empodia.

Male abdomen: First through sixth tergites entire, rectangular, with posterior row of setae, usually with lateral setae, anterior pair of trichoid sensilla, and otherwise mostly covered with setiform scales. Seventh and eighth tergites more weakly sclerotized; seventh tergite usually with 1–several posterolateral setae, a few scales, with anterior pair of trichoid sensilla; eighth tergite bare except for anterior pair of trichoid sensilla. Cerci variable, triangular or ovoid. Hypoproct bilobed, variable in shape and vestiture. Aedeagus short to moderately long. Gonocoxite with small, obtuse mesobasal lobe. Gonostylus tapered gradually from wide base to narrower, toothed apex, with scattered setae, setulose basally, remainder of surface marked with minute longitudinal ridges.

Female abdomen: First through seventh tergites entire, rectangular, with posterior row or rows of setae, usually with lateral group of setae, anterior pair of trichoid sensilla, and otherwise covered with setiform scales; eighth tergite shorter, narrower, and more weakly sclerotized than preceding, with either weak, scattered setae or strong setae mixed with scales posteriorly and anterior pair of trichoid sensilla; ovipositor short-protrusible, less than 1½ length of seventh tergite, with ventral setae on intersegmental membrane, evenly distributed setae on ninth segment, with or without setae on tenth tergum; cerci short to long, more or less bilaterally flattened, with 2–4 ventroapical, thick, setiform sensoria on each, and otherwise covered with setulae; hypoproct variably shaped.

Pupa.—Vertex with conspicuous projection. Two pairs of vertexal papillae present, one of each pair with elongate seta and enlarged base. Antennal bases evenly rounded or angular. Face with or without horns, with or without pair of setae mesally. Prothoracic spiracle several times as long as wide. Abdominal segments uniformly spiculose, without spines.

Larva.—Third instar: Body flattened-cylindrical, rounded at both ends. Integument mostly rugose. Antenna less than twice as long as wide. Spatula with two acutely triangular anterior projections, intervening concavity smooth to minutely dentate. Papillar pattern generally as for Cecidomyiidi (Gagné 1989a): lateral papillae on each side of spatula reduced in some species to the two setose pairs; dorsal and pleural papillae with setae little longer than wide; terminal segment with 2 or 4 pairs of papillae.

Second instar: Spatula present. Otherwise as for third instar.

Type species.—*Lophodiplosis indentata* Gagné.

Etymology.—*Lophodiplosis* is of feminine gender and combines the Greek "lophos," meaning "crest" with "diplosis." The prefix refers to the protruding vertex of the pupa. The suffix has been commonly used for genera of the supertribe Cecidomyiidi and means "double," with reference to the binodal male flagellomeres.

Relationships.—*Lophodiplosis* belongs to the supertribe Cecidomyiidi. Uniquely derived characters (sometimes secondarily lost) of the supertribe are the dorsal protu-

berance of the adult head and the binodal, tricircumfilar male antennal flagellomeres. This genus differs from all other known genera of Cecidomyiidi except *Acacidiplosis* in the development of the pupal vertex into a protuberance or crest instead of or in addition to the antennal horns. This development appears to be another strategy to allow pupae to cut their way out of the galls. Although the five species placed here are otherwise diverse, we regard the pupal head character as a shared, derived character until we have better knowledge of the Australian cecidomyiid fauna. The presence of a similar modification in *Acacidiplosis,* an African genus restricted to *Acacia* spp., presumably arose separately in that genus because not all *Acacidiplosis* species have it (Gagné and Marohasy 1994) and the two genera share no other obvious derived characters. *Acacidiplosis* differs from *Lophodiplosis* in having no vertexal protuberance in the adult, less than four palpal segments, and small, asetulose, dorsoventrally compressed and mesally joined female cerci.

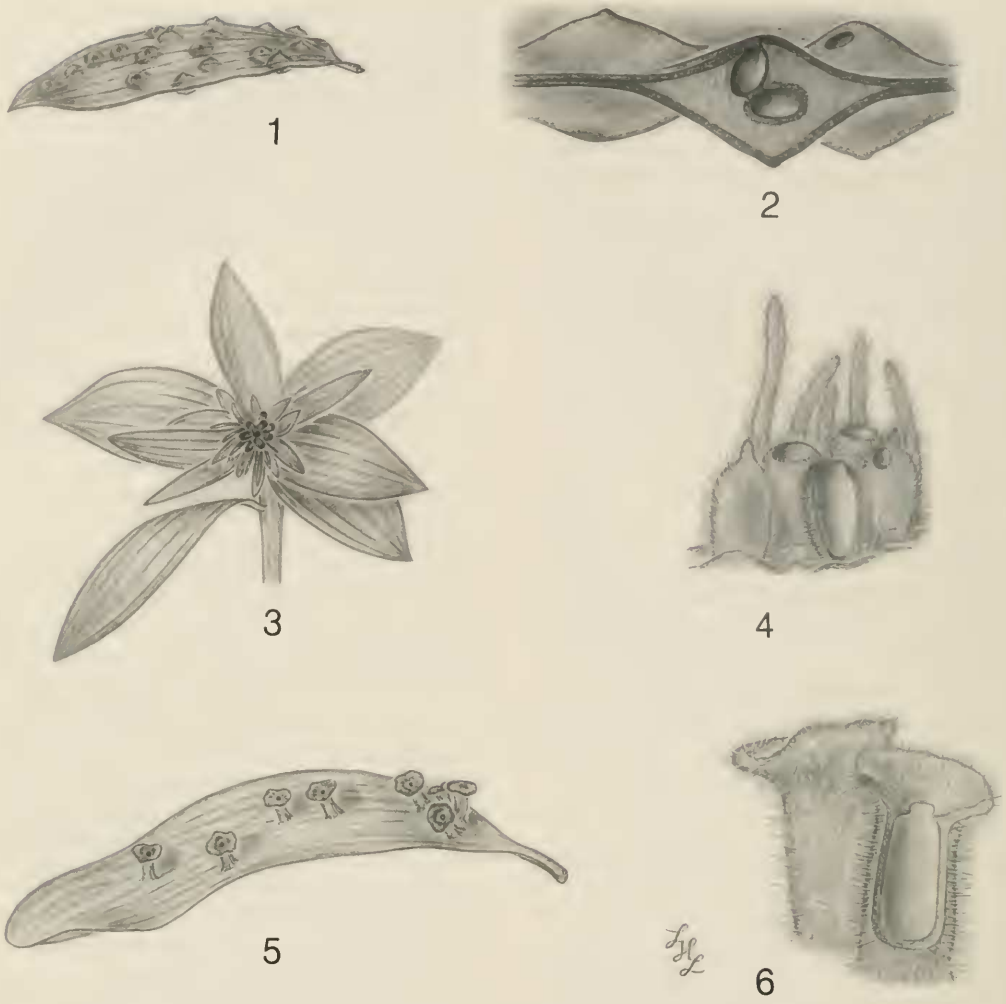
Key to Adults of Australian Genera of the Supertribe Cecidomyiidi

Lophodiplosis is the first genus of Cecidomyiidi outside of the tribe Asphondyliini to be based exclusively on Australian species. Except for the Skuse species, which remain essentially unknown (Gagné 1989b), all the non-asphondyliine Cecidomyiidi identified from Australia to date are satisfactorily placed in cosmopolitan genera (Gagné 1989b). The nine genera keyed below are doubtless only a small sample of what will be found in Australia, but the key serves to place *Lophodiplosis* for future identification. Following each generic name is the most up-to-date and comprehensive reference. For a list of Australian species in each of the genera, see Gagné (1989b).

1. Male gonostylus situated on dorsum of gonocoxite; female seventh sternite at least 1½ times length of sixth sternite 2
– Male gonostylus situated on apex of gonocoxite; female seventh sternite not appreciably longer than sixth 4
2. Empodia much shorter than tarsal claws; male flagellomeres with necks; female without dorsal pair of lobes at base of intersegmental membrane of ovipositor . . . . . *Skusemyia* (see Kolesik 1995a)
– Empodia as long as tarsal claws; male flagellomeres without necks; female with dorsal pair of lobes at base of intersegmental membrane of ovipositor 3
3. Surface of flagellomeres covered with closely anastomozing circumfila; ovipositor short, pliable . . . . . *Eocincticornia* (see Kolesik 1995b)
– Surface of flagellomeres with only weakly anastomozing circumfila in male but not in female; ovipositor long, needle-like, sclerotized . . . . . *Asphondylia* (see Gagné 1994)
4. Tarsal claws curved near basal third 5
– Tarsal claws curved beyond midlength 6
5. Head without vertexal protuberance . . . . . *Diadiplosis* (see Gagné 1994)
– Head with vertexal protuberance . . . . . *Feltiella* (see Gagné 1995)
6. Head with vertexal protuberance; male flagellomeres with 3 circumfila occasionally interconnected . . . . . *Lophodiplosis*
– Head without vertexal protuberance; male flagellomeres with 2 circumfila 7
7. Palpus 3 segmented, third segment inserted subapically on second; female cerci bilaterally compressed . . . . *Zeuxidiplosis* (see Harris 1966)
– Palpus 3 or 4 segmented, if with only 3, the third segment inserted apically on second; female cerci dorsoventrally compressed 8
8. Abdominal second through seventh tergites without lateral setae at midlength . . . . . *Stenodiplosis* (see Gagné 1994)
– Abdominal tergites with lateral setae at midlength . . . . . *Contarinia* (see Harris 1979)

The Species of *Lophodiplosis*

Besides the five new species keyed and described below, two Australian species reported earlier from *Eucalyptus,* a genus close to *Melaleuca,* may also belong to *Lophodiplosis.* These are "*Cecidomyia*" *parilis* Skuse (1888: 87) and "*Cecidomyia*" *eucalypti* Skuse (1890: 381), both described on the basis of superficial characters. "*Cecidomyia*" *parilis* was originally described from a female collected by Skuse from Middle Harbour, New South Wales. This pinned specimen, with abdomen and appendages intact, is in the ANIC and labeled,



Figs. 1–6. Galls of *Lophodiplosis* spp. on *Melaleuca* spp. Figs. 1–2, Blister leaf galls of *L. indentata* on *M. dealbata*: 1, 1x; 2, 6x, leaf in cross section showing larval feeding chamber and exit tube after adult has emerged. Figs. 3–4, Rosette bud gall of *L. bidentata* on *M. quinquevervia*: 3, 1x; 4, 6x, group of larval cells with adjacent modified leaves from center of bud, one cell entire, three with apex dehisced following successful departure of adult (one in x-section), and one with hole made by parasitoid. Figs. 5–6, Trumpet leaf galls of *L. cornuata* on *M. viridiflora*; 5, 1x; 6, 6x, two galls, one in cross section.

"Dipl. parilis, ♀ type, F.A.A. Skuse, Middle Harb., S." Skuse (1890) later identified as this species females bred from leaf blister galls on *Eucalyptus corymbosa* collected by Froggatt at Waverley, near Sydney. The leaf blisters suggest those of *L. indentata* on *Melaleuca*. Four female specimens immediately follow the type of *C. parilis* in the ANIC, each bearing a single label reading, "bred Nov. 20." These may be Froggatt's specimens, but until these and the type are slide mounted, we cannot know whether Froggatt's specimens really belong to "*C.*" *parilis* or even if "*C.*" *parilis* fits in *Lophodiplosis*. "*Cecidomyia*" *eucalypti* known from evidently a single female ("Description drawn from fresh specimen") from Botany, New South Wales, was reared from woody swellings on stems of *Eucalyptus haemastoma*. There is no specimen labelled *eucalypti* in the Skuse collection ANIC.

Another Australian species, "*Cecidomyia*" *frauenfeldi* Schiner (1868: 7) was reared from rosette-like malformations covering the swollen branch buds of a species of *Melaleuca* found at "Naraby Lagoon" [prob. for Narabeen Lagoon per note by Skuse 1888: 62], Port Jackson [Sydney, New South Wales]. The adults were described as having more than 12 flagellomeres, with those of the male stemmed, which indicates they belong to neither *Lophodiplosis* nor *Lasioptera,* the two genera we have found on *Melaleuca.*

Key to Adults of *Lophidiplosis* spp. and *Lasioptera* on *Melaleuca*

1. R_5 about half wing length (Fig. 58); inquiline or successor in blister galls of *Lophodiplosis indentata* and trumpet galls of *Lophodiplosis cornuata* . . . . . *Lasioptera uncinata*
– R_5 reaching costa beyond wing apex (Fig. 11) 2
2. Tarsal claws simple (Fig. 10); male flagellomeres with short, indistinct internodes and circumfilar loops barely longer than wide (Fig. 8) 3
– Tarsal claws toothed (Fig. 24); male flagellomeres with distinct internodes and circumfilar loops much longer than wide (Fig. 21) 4
3. Tarsal claws amber colored; vertexal protuberance elongate with apical and lateral setae (Fig. 7); male circumfila interconnected (Fig. 8); from leaf blister galls . . *Lophodiplosis indentata*
– Tarsal claws dark brown; vertexal protuberance short with only apical setae (Fig. 23); male circumfila not interconnected (as in Fig. 21); from trumpet leaf galls . . . . . *Lophodiplosis cornuata*
4. Tarsal claws dark brown, with 2 teeth (Fig. 24); female eighth tergite with distinct row of setae posteriorly; male cerci triangular (Fig. 25); from bud rosette galls . . *Lophodiplosis bidentata*
– Tarsal claws amber colored, with single tooth (Fig. 18); female eighth tergite with only scattered setae posteriorly; male cerci quadrate or secondarily lobed (Figs. 20, 41) 5
5. Vertexal protuberance elongate with lateral setae (as in Fig. 7); aedeagus shorter than hypoproct (Fig. 20); setae at base of female cerci longer than cerci (as in Fig. 13); from leaf blister galls . . . . . *Lophodiplosis denticulata*
– Vertexal protuberance short with only apical setae (as in Fig. 23); aedeagus longer than hypoproct (Fig. 41); setae at base of female cerci much shorter than cerci (Fig. 43); possible inquiline in galls of *Lophodiplosis indentata, Lophodiplosis denticulata,* and *Lophodiplosis bidentata* . . . . . *Lophodiplosis trifida*

Key to Pupae of *Lophodiplosis* spp. and *Lasioptera* on *Melaleuca*

1. Vertex convex, without protuberance (Fig. 64) . . . . . *Lasioptera uncinata*
– Vertex with protuberance (Figs. 44–53) 2
2. Frons without pair of setae anterior to labrum (Figs. 44, 46); vertex with 1 central and 2 much shorter ventral protuberances (Figs. 45, 47) 3
– Frons with pair of setae anterior to labrum; vertex with a single median protuberance that may be divided apically (Figs. 48, 50, 52) 4
3. Vertex with central protuberance tapering to point (Fig. 44) . . . . . *Lophodiplosis indentata*
– Vertex with central protuberance cylindrical, concave apically (Fig. 46) . . . . . .*Lophodiplosis denticulata*
4. Vertex with protuberance shorter than height of antennal bases (Fig. 48, 49) . . . . . .*Lophodiplosis bidentata*
– Vertex with protuberance much longer than height of antennal bases (Figs. 50, 52) 5
5. Vertex with protuberance conical from base to slightly notched apex (Fig. 50) . . . . . .*Lophodiplosis cornuata*
– Vertex with protuberance strongly angled for most of length, with three apical points (Fig. 52) . . . . . *Lophodiplosis trifida*

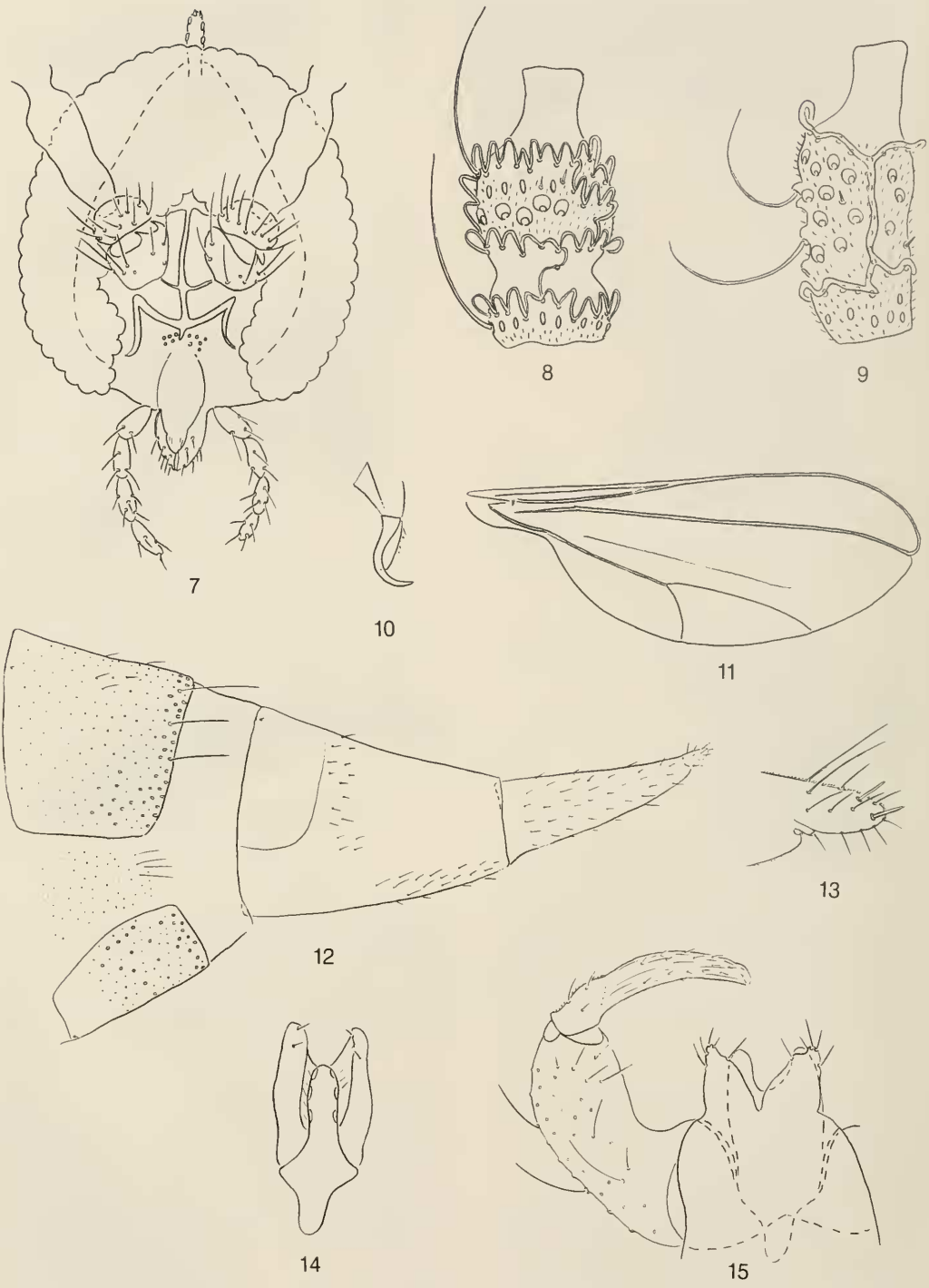
Lophodiplosis indentata Gagné, new species

Figs. 1, 2, 7–17, 44, 45

Adult.—Head (Fig. 7): Vertex with elongate dorsal protuberance bearing 4–5 setae, 2–3 at or near apex, the remainder near midlength. Male flagellomeres (Fig. 8) binodal, internodes very short, necks moderately long, nodes with sparse setulae; circumfila interconnected, bases not on same horizontal plane, loops short. Female flagellomeres (Fig. 9) cylindrical with moderately long necks; circumfila appressed except for short loops at apex.

Thorax: Wing (Fig. 11), length, 1.9–2.3 mm in males (n = 10), 2.5–3.1 mm in females (n = 10); Rs apparent only as spur of R_5, situated closer to arculus than to apex of R_1. Tarsal claws (Fig. 10) amber colored, untoothed.

Male abdomen: First through sixth ter-



Figs. 7–15. *Lophodiplosis indentata*. 7, Male head. 8, Male third flagellomere. 9, Female third flagellomere. 10, Tarsal claw and empodium. 11, Wing. 12, Female postabdomen, seventh segment to end, lateral. 13, Female cerci, detail. 14, Aedeagus and hypoproct, ventral. 15, Male genitalia, dorsal.

gites with mostly single, posterior row of setae, partly double on sixth tergite, with 0–5 lateral setae, and otherwise mostly covered with scattered setiform scales. Seventh tergite with 0–5 dorsolateral setae, 0–several setiform scales mesally, and an anterior pair of trichoid sensilla. Eighth tergite bare except for anterior pair of trichoid sensilla. Genitalia (Figs. 14–15): cerci more or less acute-triangular, with several setae posteriorly; hypoproct bilobed, laterally curving toward venter and nestling aedeagus, with 1–2 pairs of weak setae on posterolateral margins; aedeagus short, cylindrical, tapering slightly to rounded apex, reaching approximately to base of concavity of hypoproct; gonostylus with setulae present only at base.

Female abdomen (Figs. 12–13): First through fifth tergites with mesally single to laterally double, uninterrupted, posterior row of setae, sixth and seventh tergites with mesally double to laterally triple row of setae; third through seventh tergites with increasing number of lateral setae, 3–4 on third to 15–20 on seventh; first through seventh tergites covered with setiform scales; eighth tergite with weak, scattered setae posteriorly and anterior pair of trichoid sensilla; ovipositor short-protrusible, distal half about 1¼ times as long as seventh tergite, with short setae ventrally on intersegmental membrane, ninth segment with evenly distributed setae; tenth tergum without setae; cerci short, bilaterally flattened, closely approximated mesally with several setae, one pair of setiform sensoria, and otherwise covered with setulae; hypoproct entire, longer than wide.

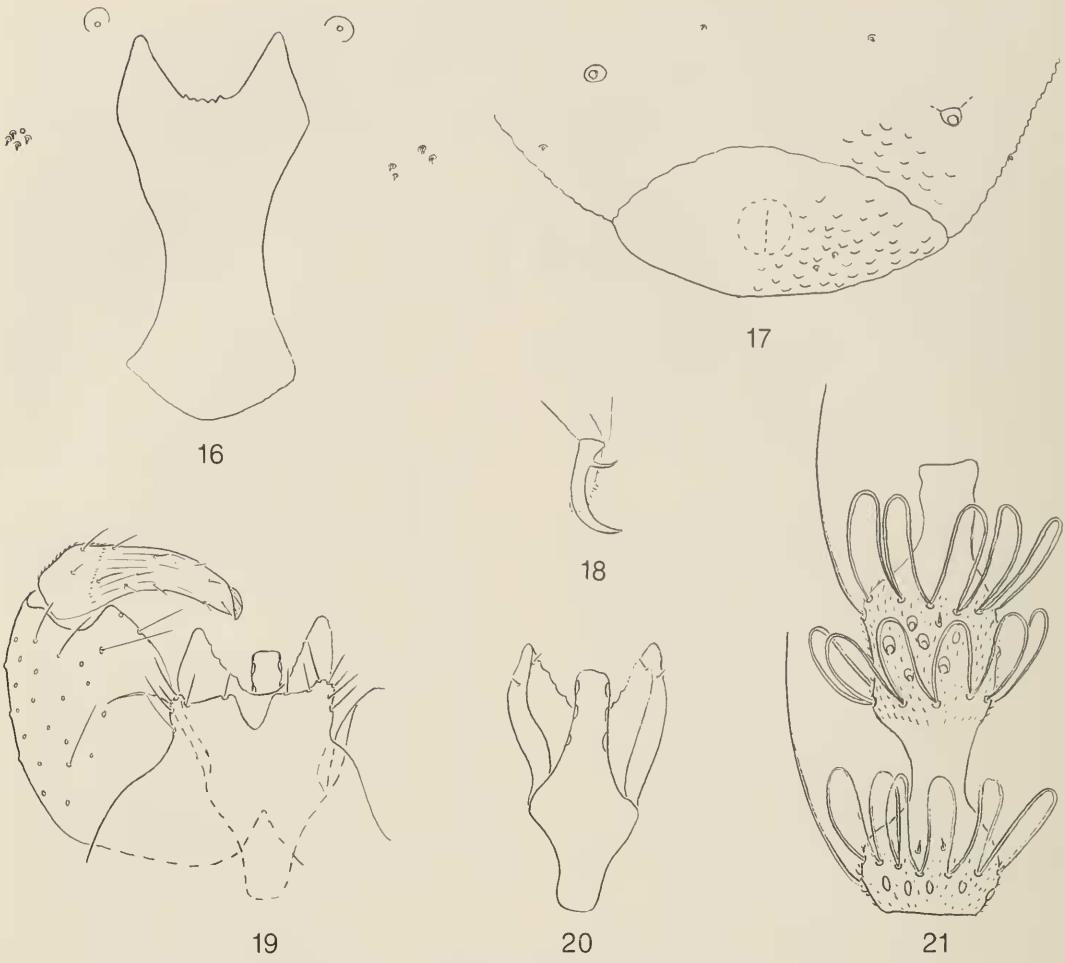
Pupa (Figs. 44–45).—Vertex with one dorsoventrally flattened, pyramidal projection and two shorter, ventral projections. Antennal bases with sharp, transverse, ventral crest. Face without setae or conspicuous protuberance.

Larva.—Third instar (Figs. 16–17): Integument mostly rugose. Spatula with two acutely triangular anterior projections, intervening concavity smooth to minutely dentate, the shaft narrowest at midlength, broadening but less sclerotized posteriorly and ending abruptly at broad base. Lateral papillae on each side of spatula reduced in most specimens to the two setose pairs, occasionally one or both asetose papillae present; dorsal and pleural papillae with setae little longer than wide; terminal papillae reduced to two pairs, with setae slightly longer than wide; anal papillae absent.

Second instar (based on specimen with fully developed third instar inside): Body shape as for third instar but shorter. Otherwise as for third instar including spatula of similar shape.

Holotype.—♂, from blister leaf galls of *M. quinquenervia,* Australia, Queensland, Tully Heads Road #3, 15.3 km ESE Tully, 17-VII-1995, JKB, FSNQMqn95137, deposited in ANIC.

Paratypes.—All specimens from blister leaf galls, Queensland, Australia, most deposited in ANIC, with representatives deposited in the USNM. From *M. quinquenervia*: 2♀, Forrest Beach, 16 km SE Ingham, 6-VII-1987, JKB, NQMqn87073; 1 pupal exuviae, Forrest Beach Swamp, 15.6 km ESE Ingham, 4-X-1994, DWB, FSNQMqn94136; 4 larvae, Forrest Beach Swamp, 15.6 km ESE Ingham, 10-V-1994, J.R. Makinson, FSNQMqn94058; ♂, Cardwell Swamp Site, 2 km SE Cardwell, 31-VIII-1992, em. 8-IX-1992, ADM, FSNQMqn92056; 3 larvae, pupa, Edge Hill, Woodward Park, 4.2 km WNW Cairns GPO, 14-VIII-1994, P. Geyson, NQMqn940 80; 3♀, Centenary Park, Cairns, 3-VIII-1987, JKB, NQMqn87085; larva, Tully Heads Rd #3, 15.3 km ESE Tully PO, 27-VI-1994, JKB, FSNQMqn94094; 5 larvae, Tully Heads Rd #3, 15.3 km ESE Tully PO, 2-VIII-1994, DWB, FSNQMqn94114; 4♂, 3♀, 2 pupal exuviae, Tully Heads Road #3, 15.3 km ESE Tully, 17-VII-1995, JKB, FSNQMqn95137 (19 more ♀ and 7 p. exuv. in alc.; from same lot as L. denticulata); 1 pupal exuviae, Tully Heads Road #3, 15.3 km ESE Tully, 14-VIII-1995, JKB, FBNQMqn95163; 4 larvae, Murrigal Cul-



Figs. 16–21. 16–17, *Lophodiplosis indentata*. 16, Larval spatula and associated papillae. 17, Larval eighth and terminal segments. 18–21, *Lophodiplosis denticulata*. 18, Tarsal claw and empodium. 19, Male genitalia, dorsal. 20, Aedeagus and hypoproct, ventral. 21, Male third flagellomere.

vert, 14.8 km S Tully, 4-X-1994, DWB, FSNQMqn94137; 6 larvae, Murrigal Gravel Pit, 19.3 km S Tully, 2-VIII-1994, DWB, FSNQMqn94112; larva, Bruce Hwy, S of Murrigal, 16 km S Tully, 10-III-1992, ADM, NQMqn92017; 5 larvae, Feluga Site 1, 9.4 km E Tully, 27-VI-1994, JKB, FSNQMqn94092; larva, Bilyana, Double Barrel Creek Swamp, 22 km NE Tully, 10-III-1992, ADM, NQMqn92018; 3 larvae, 3 pupae, Townsville, 21-II-1995, RJG; 3 larvae, Feluga Site 1, 9.4 km E Tully, 26-X-1994, JKB, FSNQMqn94142; 4 larvae, 4 pupae, South Queensland, XI-1995, DWB; 3 larvae, Doolandella, 16 km SSW Brisbane GPO, 30-V-1994, M. Purcell. From *M. dealbata*: 14♂, Cardwell North, 3 kms N Cardwell, 31-VIII-1992, em. 7-25-VII-1992, ADM, DWB, FSNQMdl92057; 2 larvae, Murrigal Culvert, 14.8km S. Tully, 18-IX-1995, DWB, FSNQMdl95188; 2♂, ♀, 2 pupal exuviae, Tully Heads Road #4, 16.9 km ESE Tully, 17-VII-1995, JKB, FSNQMd195135; 2 larvae, Tully Heads Road #4, 16.9 km ESE Tully, 27-III-1995, JKB, FSNQMd195076; 2♂, ♀, 4 pupal exuviae, Murray River Swamp, 12 km S Tully, 14-VIII-1995, JKB, FSQNMdl95159;

♂, 3♀, 4 pupal exuviae, Forrest Beach School, 16 km ESE Ingham, 14-VIII-1995 JKB, FSQNMdl95154. From *M. viridiflora*: 3 larvae, Murrigal section of Bruce Hwy, 19.3 km S Tully, 2-VIII-1994, DWB, FSNQMvr94115; 3♀, 1 pupal exuviae, Feluga Site 1, 9.4 km E Tully, 18-VII-1995, JKB, FSNQMvr95140; ♂, 2♀, 2 pupal exuviae, Feluga Site 1, 9.4 km E. Tully, 15-VIII-1995, DWB, FSNQMvr95165 (in same lot as specimens of *L. denticulata*). From *M. arcana*: 2 larvae, 1 pupal exuviae, Cape Flattery Swamp, 41.1 km N Cooktown, 25-VII-1994, JKB, NQMac94074. From *M. fluviatilis*: 3 larvae, pupa, Charters Towers, 24-II-1995, RJG. From *M. saligna*: larvae, Flying Fox Swamp, 57.2 km WNW Cooktown, 27-VII-1994, JKB, FSNQMsl9 4109.

Etymology.—The name *indentata* is Latin for "untoothed," with reference to the simple, untoothed tarsal claws of this species.

Gall (Figs. 1–2).—This species forms a leaf blister gall, a convex, occasionally low-conical swelling that shows equally on both surfaces of the leaf. Leaves infested with these galls may be curled and otherwise distorted, especially when the leaf surfaced is completely covered with the galls. One or more larvae may be found in a gall but each larva is in a discrete cell. As the larva matures, the tissue above one end of the gall changes in nature to form a cylindrical passage extending from just outside the larval cell to the abaxial surface epidermis. Pupation occurs in the larval cell. The full-grown pupa pushes its way through a thin, circular cap that develops on the larval cell wall, then proceeds through the tunnel and breaks through the thin leaf epidermis forming the cover of the tunnel and where the pupa lodges itself. The adult then breaks out of the pupa, usually leaving the pupal exuviae caught part way out of the gall exit.

Remarks.—*Lophodiplosis indentata* was commonly reared from leaf blister galls on several species of *Melaleuca* in Queensland, twice in association with *L. denticulata* (q.v.). The gall surface is rounded except on *M. dealbata* where it is usually pointed in the center (Figs. 1–2).

This species shares with *L. denticulata* an exceptionally long adult vertexal projection, the male hypoproct partially enfolding the aedeagus, and the lack of pupal facial setae. It differs from *L. denticulata* in having untoothed tarsal claws, very short flagellomere internodes and shorter, interconnected circumfilar loops, longer male gonopods, and a tapering, pyramidal protuberance on the pupal vertex.

Lophodiplosis denticulata Gagné, new species

Figs. 18–21, 46, 47

Adult.—Head (as for Fig. 7): Vertex with elongate dorsal protuberance bearing 4–5 setae, 2–3 at or near apex, the remainder near midlength. Male flagellomeres (Fig. 21) binodal, internodes and necks moderately long, nodes setulose; circumfila discrete, bases of each on same horizontal plane, loops moderately and uniformly long. Female flagellomeres (as in Fig. 9) cylindrical with moderately long necks; circumfila appressed except for short loops at apex.

Thorax: Wing (as in Fig. 11), length, 1.8–2.3 mm in males (n = 3), 2.2–2.3 mm in females (n = 2); Rs apparent only as a spur off R_5, situated closer to arculus than to apex of R_1. Tarsal claws (Fig. 18) amber colored, with fine basal tooth.

Male abdomen: First through sixth tergites with mostly single, posterior row of setae, sometimes mostly double on sixth tergite, with 0–5 lateral setae, and otherwise mostly covered with scattered setiform scales. Seventh tergite with 0 dorsolateral setae and O-several setiform scales mesally. Eighth tergite bare except for anterior pair of trichoid sensilla. Genitalia (Figs. 19–20): cerci more or less quadrate, longest at posterolateral angle, with several setae posteriorly; hypoproct bilobed, laterally curving toward venter and nestling the aedeagus, with 1–2 pairs of weak setae on posterolat-

eral margins; aedeagus short, cylindrical, tapering slightly to rounded apex, reaching almost to posterior margins of hypoproct; gonostylus with setulae present only at base.

Female abdomen: First through fifth tergites with mesally single to laterally double, uninterrupted, posterior row of setae, sixth and seventh with mesally double to laterally triple row of setae; third through seventh tergites with 3–7 lateral setae; first through seventh tergites otherwise covered with setiform scales; eighth tergite with weak, scattered setae posteriorly and anterior pair of trichoid sensilla; ovipositor similar to that of *L. indentata,* short-protrusible, distal half about 1¼ times as long as seventh tergite, with short setae present ventrally on intersegmental membrane, evenly distributed setae on ninth segment; bare of setae on tenth tergum; cerci short, bilaterally flattened, closely approximated mesally with several setae, each with one pair of setiform sensoria, and otherwise covered with setulae; hypoproct entire, longer than wide.

Pupa (Figs. 46–47).—Vertex with one elongate, cylindrical, ventromesal projection with concave, crenulate apex, and two shorter, ventral projections. Antennal bases with sharp, transverse, ventral crest. Face without setae or conspicuous protuberance.

Larva.—Unknown. If similar to *L. indentata,* specimens of *L. denticulata* may be included among those listed for *L. indentata.*

Holotype.—♂, from blister leaf galls of *M. quinquenervia,* Australia, Queensland, Tully Heads Road site #3, 15.3 km ESE Tully, 17-VII-1995, JKB, FSNQMqn95137, deposited in ANIC.

Paratypes.—All specimens from Queensland, Australia, and from blister galls on *Melaleuca* spp., deposited in ANIC except for one male and three pupal exuviae in USNM: ♂, same data as holotype (both from same lot as *L. indentata*); ♀, *M. quinquenervia,* Edge Hill, Pease St. Park, Cairns, 2-IX-1992, em. by 18-IX-1992, JKB, NQMqn92060; ♂, *M. quinquenervia,* Feluga Site 3, 13 km NE Tully, 31-VIII-1992, em. 6-IX-1992, ADM, FSNQMqn 92058; ♀, 5 pupal exuviae, *M. viridiflora,* Feluga Site 1, 9.4 km E. Tully, 15-VIII-1995, DWB, FSNQMvr95165 (in same lot as specimens of *L. indentata*).

Etymology.—The name *denticulata* is a Latin diminutive for "toothed," with reference to the thin tooth present at the base of the tarsal claws of this species.

Gall.—This species was reared from the swollen leaf blister galls on *M. quinquenervia* and *M. viridiflora* (Figs. 1–2) similar to those attributed here mainly to *L. indentata.* Both species may cause the galls but *L. denticulata* was much less commonly reared.

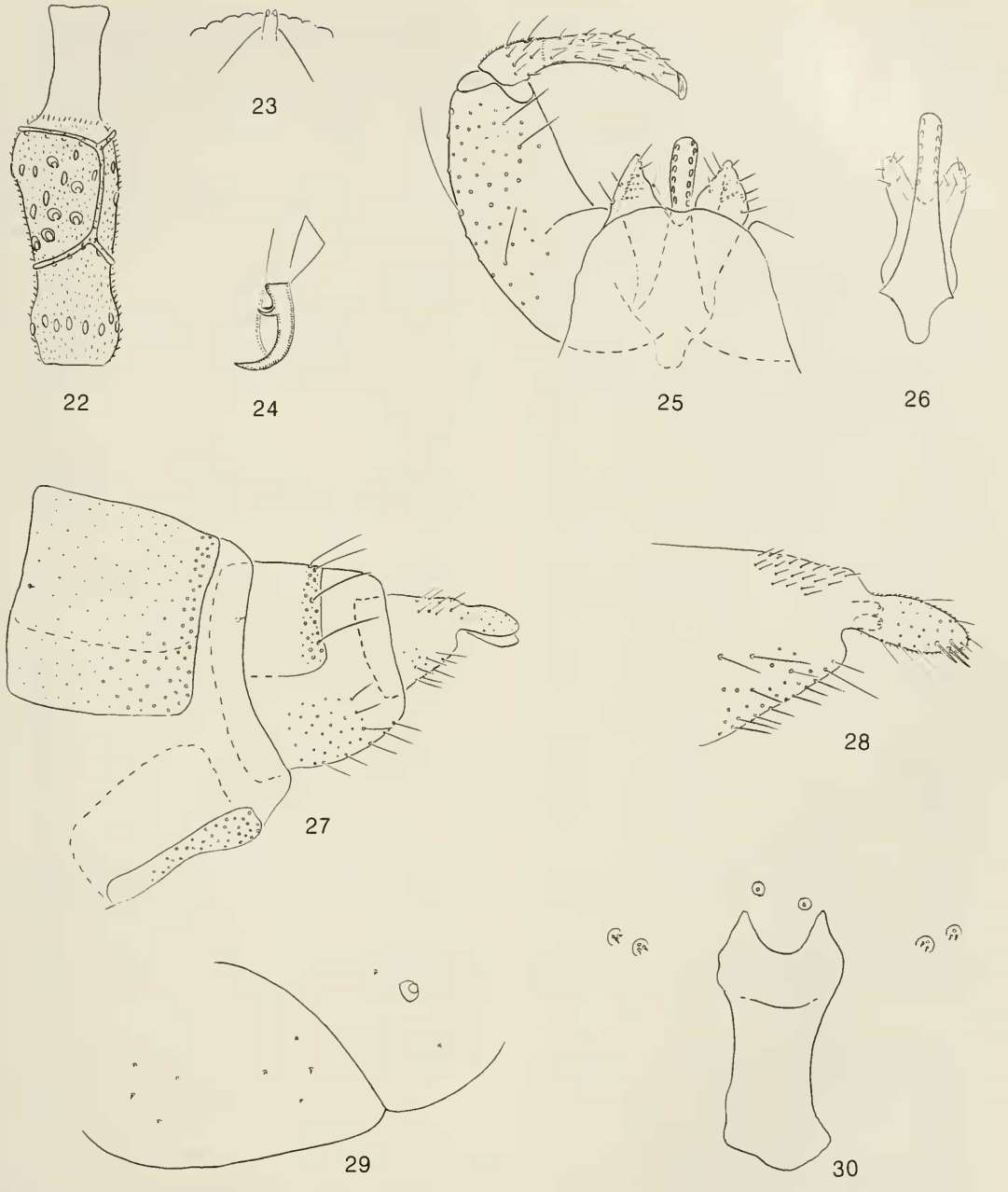
Remarks.—This species shares with *L. indentata* the exceptionally long adult vertexal projection, the male hypoproct partially enfolding the aedeagus, and the lack of pupal facial setae. It differs from *L. indentata* in having toothed tarsal claws, longer flagellomere internodes and longer, discrete, circumfilar loops, shortened male gonopods, and a longer, more cylindrical protuberance on the pupal vertex.

This species was reared four times from leaf blister galls similar to those of *L. indentata,* from four separate localities in northern Queensland and represented by one or two adults each and, in one of those cases, by five pupal exuviae. In two of those collections, *L. denticulata* was found in association with *L. indentata.* Larvae, if similar to those of *L. indentata,* may be mistakenly listed under that species. We can offer no speculation for why these closely related species occupy similar galls on the same hosts and at the same sites.

Lophodiplosis bidentata Gagné, new species

Figs. 3, 4, 22–30, 48, 49

Adult.—Head: Vertex with short dorsal protuberance bearing 2 setae at or near apex (Fig. 23). Male flagellomeres (similar to that of *L. denticulata,* Fig. 21) binodal, internodes and necks moderately long; cir-



Figs. 22–30. *Lophodiplosis bidentata.* 22, Female third flagellomere. 23, Vertexal projection. 24, Tarsal claw and empodium. 25, Male genitalia, dorsal. 26, Aedeagus and hypoproct, ventral. 27, Female postabdomen, seventh segment to end, lateral. 28, Female ninth segment to end, detail. 29, Larval eighth and terminal segments. 30, Larval spatula and associated papillae.

cumfila discrete, bases of each on same horizontal plane, loops moderately and uniformly long. Female flagellomeres (Fig. 22) with nodes slightly constricted near basal third, necks elongate.

Thorax: Wing length, 2.4–2.6 mm in

males (n = 4), 3.0–3.2 mm in females (n = 4); Rs situated closer to arculus than to apex of R_1. Tarsal claws (Fig. 24) dark brown, with two basal teeth, the proximal tooth finer.

Male abdomen: First through sixth tergites with mostly single, but double laterally, posterior row of setae, mostly double row on sixth tergite, all with 3–5 lateral setae. Seventh tergite with 3–5 dorsolateral setae, and 0–3 scales posterolaterally. Eighth tergite bare except for anterior pair of trichoid sensilla. Genitalia (Figs. 25–26): cerci triangular, laterally curved ventrally, with several setae along margin; hypoproct bilobed, with several scattered pairs of setae ventrally; aedeagus longer than hypoproct, tapering gradually from base to midlength and widening slightly beyond to rounded apex, with rows of several papillae; gonostylus with setulae present on basal fourth.

Female abdomen (Figs. 27–28): First through fifth tergites with mostly double posterior row of setae, sixth and seventh with triple row of setae; third through seventh tergites with increasing number of lateral setae, 3–4 on third to 10 on seventh; eighth tergite with a mostly double posterior row of strong setae mixed with setiform scales and anterior pair of trichoid sensilla; ovipositor short-protrusible, distal half about ½ times as long as seventh tergite, with many setae present laterally and ventrally on intersegmental membrane and ventrally on ninth segment; tenth tergum covered laterally with setae; cerci ovoid, bilaterally flattened, closely approximated mesally, with several setae, each with 3–4 setiform sensoria, and otherwise covered with setulae; hypoproct broad, deeply bilobed.

Pupa (Figs. 48–49).—Vertex with short, ventral, triangular, dorsoventrally flattened, slightly notched projection. Antennal bases simply rounded. Face with pair of setae anterior to labrum, without protuberance.

Larva.—Third instar (Figs. 29–30): Integument mostly smooth. Spatula with two acutely triangular anterior projections, the shaft narrowest at midlength, broadening posteriorly and ending abruptly at broad base. Lateral papillae in two groups of three on each side of spatula, 2 of each group with seta, the other without; dorsal and pleural papillae with setae not longer than papilla base; terminal segment with 4 papillae on each side, the setae all tiny but one on each side slightly longer than remainder.

Second instar: Body shape as for third instar but shorter. Otherwise as for third instar except spatula smaller and not sclerotized posteriorly.

Holotype.—♂, from rosette galls of *M. quinquenervia,* Australia, Queensland, Feluga site #1, 9.4 km E Tully, 15-VIII-1995, DWB, FSNQMqn95166, deposited in ANIC.

Paratypes.—All specimens from *M. quinquenervia,* Queensland, Australia, most deposited in ANIC, with representatives deposited in USNM: 2♂, 3♀, 2 pupal exuviae, Feluga site #1, 9.4 km E Tully, 15-VIII-1995, DWB, FSNQMqn95166; 2 larvae, Feluga Site #1, 9.4 km E Tully, 27-VI-1994, JKB, FSNQMqn94042; pupa, larva, Feluga Site #1, 9.4 km E Tully, 26-X-1994, JKB, FSNQMqn94142; 2♂,1♀, Feluga site #1, 9.4 km E Tully, 18-VII-1995, JKB, FSNQMqn95139; 1 pupa, Feluga site #1, 9.4 km E Tully, 10-XII-1993, DWB, FSNQMqn93084; 2 larvae, Tully Heads Road #3, 15.3 km ESE Tully PO, 27-VI-1994, JKB, FSNQMqn94094; ♂, Tully Heads Road #3, 15.3 km ESE Tully PO, 22-II-1995, RJG; pupa, Murrigal Gravel Pit, 19.3 km S Tully, 28-III-1995, JKB, FBNQMqn95086; 3 pupae, Murrigal Section of Bruce Hwy, 19.3 km S Tully, 11-V-1993, JKB, NQMqn93025; pupa, larva, 16 km ESE Ingham, Forrest Beach Swamp, 15.6 km ESE Ingham, 2-VIII-1994, DWB, FSNQMqn94110.

Etymology.—The name *bidentata* is Latin for "two toothed," with reference to the two teeth present at the base of the tarsal claws of this species.

Gall (Figs. 3–4).—The gall made by this

species is made up of a hard, ovoid larval cell closely surrounded by modified leaves. Many separate galls may occur in aggregate on a single bud. Galls develop on terminal or lateral buds and cause a foreshortening of the branch so that all the leaves around the gall form a rosette. These galls stunt the surrounding leaves and prevent normal branch elongation where they occur. Pupation occurs in the gall. At that time a circular, weakened area develops at the apex of the cell. The fully developed pupa pushes about half way through the trap door where it lodges. The adult then breaks out of the pupa.

Remarks.—*Lophodiplosis bidentata* is distinct from the other species of *Lophodiplosis* in having two teeth at the base of each tarsal claw, triangular male cerci and narrow hypoproct, a short ovipositor with more than a pair of setiform sensoria on the cerci and a two-lobed hypoproct, and a short, dorsoventrally compressed protuberance on the pupal vertex.

Lophodiplosis cornuata Gagné, new species

Figs. 5, 6, 31–38, 50, 51

Adult.—Head: Vertex with short dorsal protuberance bearing 2 apical or subapical setae, placed at or near apex. Male flagellomeres (Fig. 31) only weakly binodal with very short internode but long neck; 1 circumfilum on basal node, 2 on distal node, all with very short loops. Female flagellomeres (Fig. 32) cylindrical with moderately long necks; circumfila appressed.

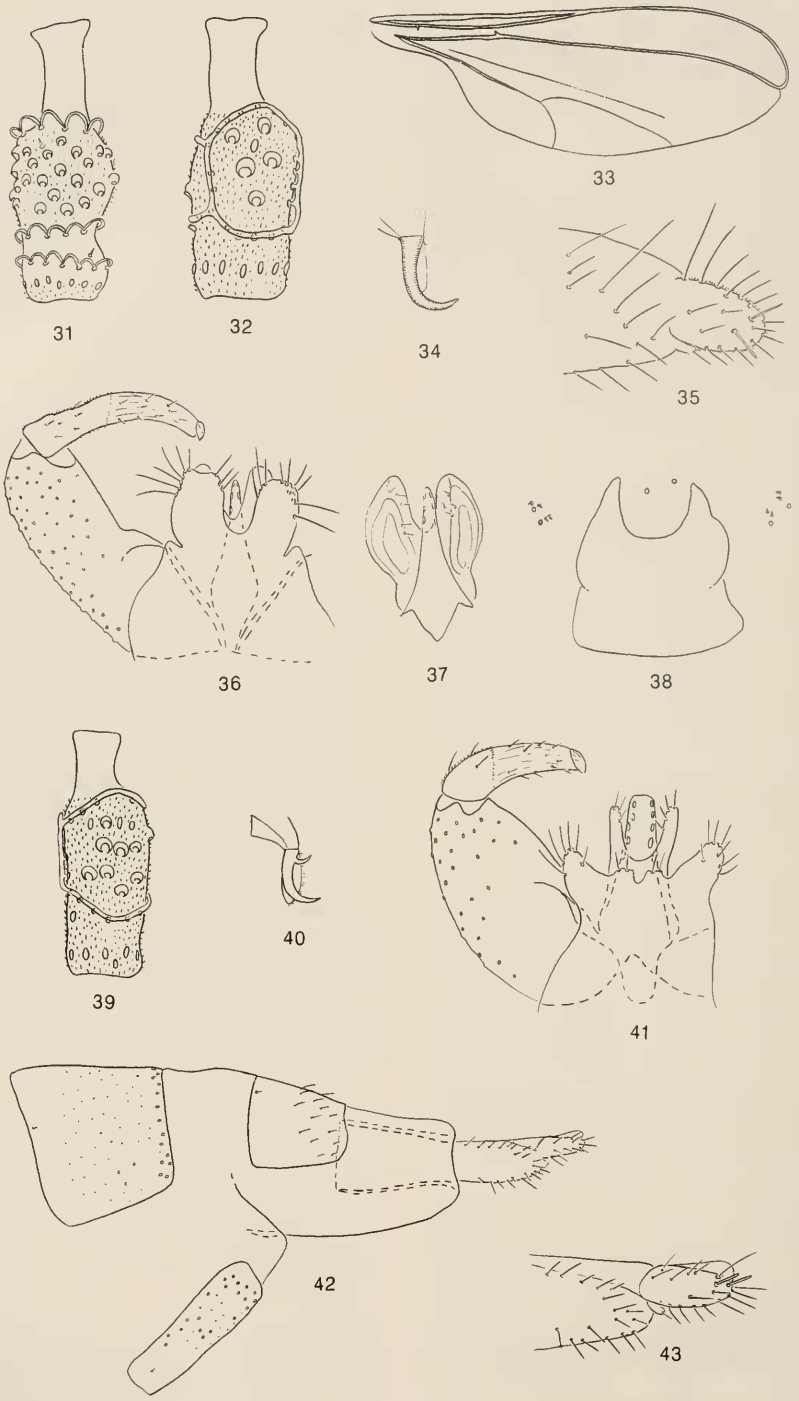
Thorax: Wing (Fig. 33), length, 2.6–2.8 mm in males (n = 4), 2.8–3.2 mm in females (n = 4); Rs apparent only as spur of R_5, situated closer to apex of R_1 than to arculus. Tarsal claws (Fig. 34) dark brown, untoothed; empodia almost reaching bend in claws.

Male abdomen: First through sixth tergites with mostly single, sometimes double laterally, posterior row of setae, sometimes mostly double row on sixth tergite, with 3–6 lateral setae. Seventh tergite with 3–6 dorsolateral setae, several setiform scales mesally. Eighth tergite bare except for anterior pair of trichoid sensilla. Genitalia (Figs. 36–37): cerci rounded to blunt posteriorly, with several prominent lateral and mesal setae; hypoproct deeply lobed, bulging ventrally, more or less nestling aedeagus, with several pairs of weak setae ventrally; aedeagus shorter than hypoproct, cylindrical, tapering from base to narrow apex; gonostylus with setulae present on basal half.

Female abdomen: First through fifth tergites with mesally single to laterally double, uninterrupted, posterior row of setae, sixth and seventh with mesally double to laterally triple row of setae; third through seventh tergites with increasing number of lateral setae, 3–4 on third to 15–20 on seventh; eighth tergite shorter, narrower, and more weakly sclerotized than preceding, with scattered weak posterior setae and anterior pair of trichoid sensilla; ovipositor short-protrusible, distal half about 1¼ times as long as seventh tergite, with short setae ventrally on intersegmental membrane, evenly distributed setae on ninth segment; tenth tergum without vestiture; cerci (Fig. 35) short, bilaterally flattened, closely approximated mesally with several setae, those at base no longer than cerci, each with one pair of setiform sensoria, and otherwise covered with setulae; hypoproct as wide as long.

Pupa (Figs. 50–51).—Vertex conical, more bulbous basally, tapering near midlength to dorsoventrally flattened, apically notched and slightly recurved apex. Antennal bases simply rounded. Face with pair of setae mesally and without conspicuous protuberance.

Larva.—Third instar: Integument completely rugose. Spatula (Fig. 38) with two acutely triangular anterior projections, the shaft very short. Lateral papillae in two groups of three on each side of spatula, 2 of each group with setae, the third without; dorsal and pleural papillae with setae not longer than papilla bases; terminal segment



Figs. 31–43. 31–38, *Lophodiplosis cornuata*. 31, Male third flagellomere. 32, Female third flagellomere. 33, Wing. 34, Tarsal claw and empodium. 35, Female apex of ninth abdominal segment and cerci, lateral. 36, Male genitalia, dorsal. 37, Aedeagus and hypoproct, ventral. 38, Larval spatula and associated papillae. 39–43, *Lophodiplosis trifida*. 39, Female third flagellomere. 40, Tarsal claw and empodium. 41, Male genitalia, dorsal. 42, Female postabdomen, seventh segment to end, lateral. 43, Female apex of ninth abdominal segment and cerci, lateral.

with undetermined number of convex papillae with short setae.

Holotype.—♂, from trumpet-shaped leaf galls of *M. viridiflora* Australia, Queensland, Magnetic I., 5-III-1995, RJG, deposited in ANIC. Paratypes.—All specimens from trumpet-shaped leaf galls, Queensland, Australia, most deposited in ANIC, with representatives deposited in USNM: 3♂, 3♀, 3 pupal exuviae, on *M. viridiflora,* Magnetic I., 5-III-1995, RJG; 2♀, 7 pupal exuviae, on *M. viridiflora,* 16 km ESE Ingham, Forrest Beach School, 14-VIII-1995, JKB, FSNQMvr94154; 2 larvae, *M. nervosa,* Angus Smith Drive, Townsville, 21-III-1995, DWB.

Etymology.—The name *cornuata* is Latin for "hornlike" with reference to the shape of the gall that suggests the end of a trumpet.

Gall (Figs. 5–6).—This species forms a trumpet shaped gall on the abaxial leaf surface of *M. viridiflora* and *M. nervosa.* Pupation occurs in the gall. The pupa breaks out of the apex of the gall and becomes lodged in the aperture, whereupon the adult emerges from the pupa.

Remarks.—This species is distinct from the other species of *Lophodiplosis* in the inconspicuous internode and short circumfila of the male antenna, the simple, dark brown tarsal claws, the shape of the male genitalia, and the large, slightly recurved, conical vertexal pupal protuberance.

Lophodiplosis trifida Gagné, new species

Figs. 39–43, 52, 53

Adult.–Head: Vertex with short dorsal protuberance bearing 2 setae near apex. Male flagellomeres (as in Fig. 21) binodal, internodes and necks moderately long, nodes setulose; circumfila discrete, bases of each on same horizontal plane, loops moderately and uniformly long but not reaching base of next node or circumfilum. Female flagellomeres (Fig. 39) cylindrical with moderately long necks; circumfila appressed.

Thorax: Wing (as in Fig. 11), length, 2.0 mm in males (n = 1), 2.2–2.3 mm in females (n = 5); Rs apparent only as spur of R_5, situated closer to arculus than to apex of R_1. Tarsal claws (Fig. 40) amber colored, toothed.

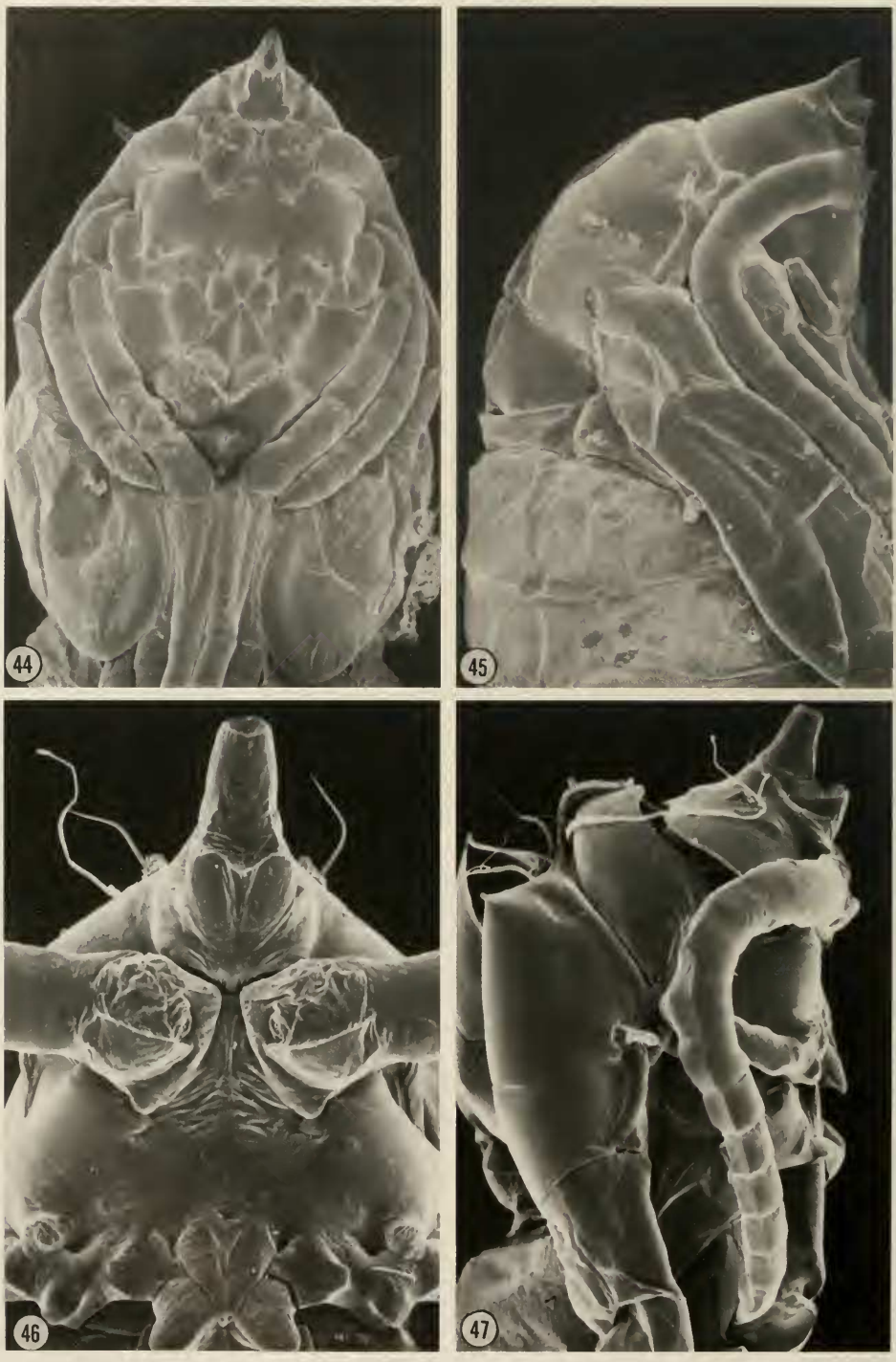
Male abdomen: First through sixth tergites with mostly single, uninterrupted, posterior row of setae, and 2–6 lateral setae. Seventh tergite with 2–5 dorsolateral setae and several setiform scales. Eighth tergite bare except for anterior pair of trichoid sensilla. Genitalia (Fig. 41): cerci barely divided mesally, with short mesoposterior lobe and longer more or less triangular lateroposterior lobe, both lobes setose; hypoproct deeply lobed, the two lobes narrow and elongate, setose posteriorly; aedeagus elongate, longer than hypoproct lobes, tapering gradually from base to blunt apex; gonostylus with setulae present on basal third.

Female abdomen (Figs. 42–43): First through fifth tergites with mesally single to laterally double, uninterrupted, posterior row of setae, sixth and seventh with mesally double to laterally triple row of setae; third through seventh tergites with increasing number of lateral setae, 3–4 on third to 15–20 on seventh; eighth tergite with weak posterior setae and anterior pair of trichoid sensilla; ovipositor short-protrusible, distal half about 1¼ times as long as seventh tergite, with scattered setae ventrally on intersegmental membrane; setae evenly distributed on ninth segment; tenth tergum without setae; cerci elongate-ovoid, each with one pair of setiform sonsoria; hypoproct entire, longer than wide.

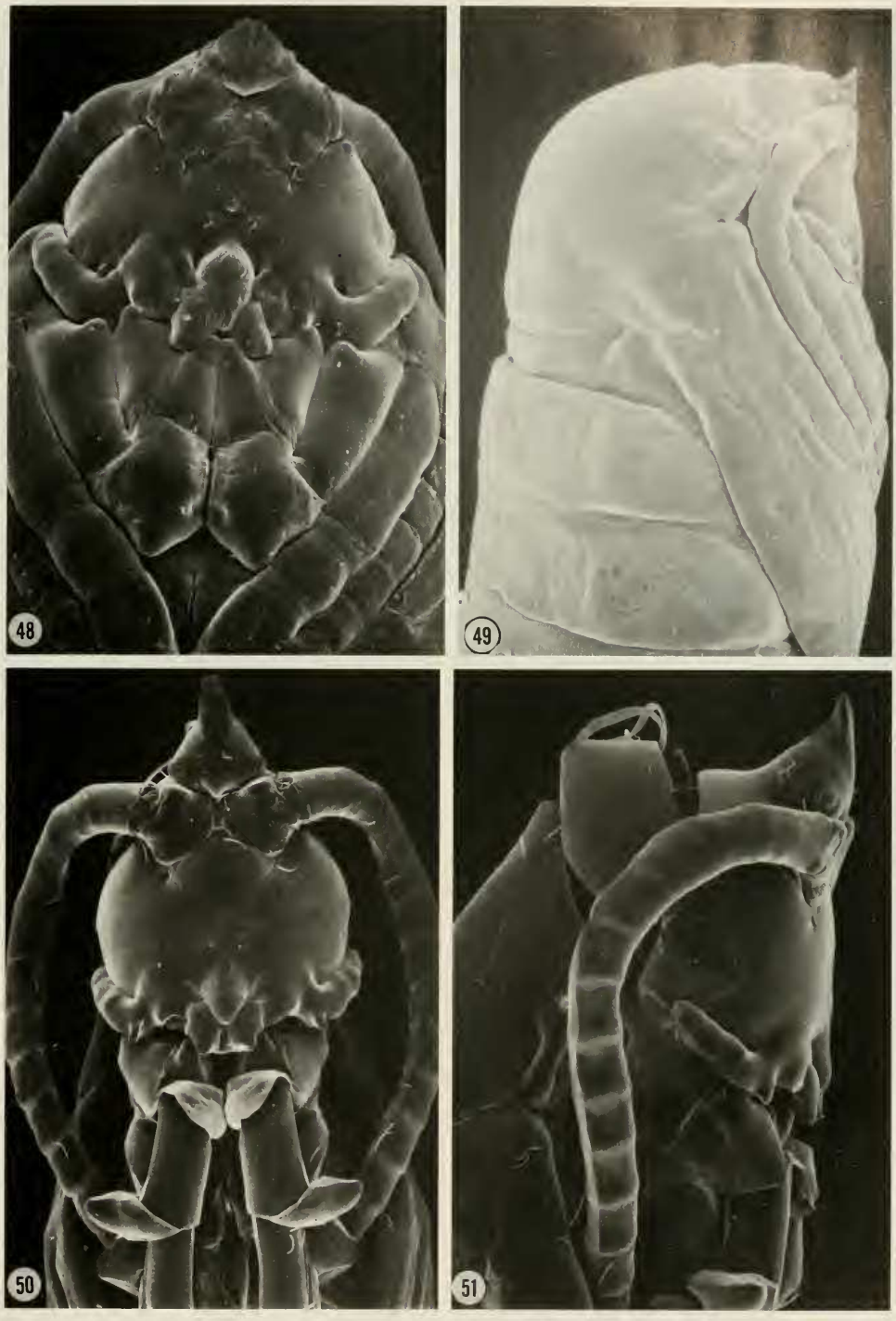
Pupa (Figs. 52–53).—Vertex with elongate mesal projection, deeply angled along entire length, three-pointed apically. Antennal bases each with ventral, conical horn. Face with two horns anteriorly near base of antennae and with pair of setae near middle.

Larva.—Unknown.

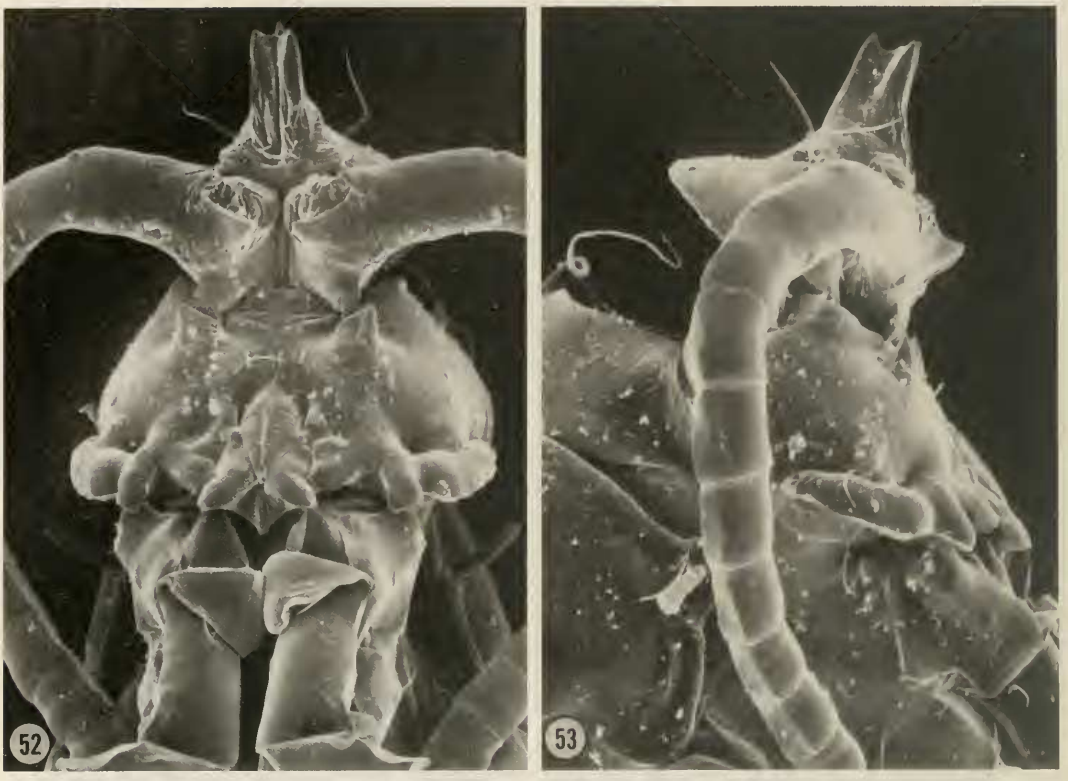
Holotype.—♂, from blister leaf galls of *M. quinquenervia,* Australia, Queensland, Tully Heads Road #3, 15.3 km ESE Tully, 17-VII-1995, JKB, FSNQMqn95137, deposited in ANIC.



Figs. 44–47. Pupae or pupal exuviae of *Lophodiplosis* spp. 44, *L. indentata*, ventral. 45, Same, lateral. 46, *L. denticulata*, ventral. 47, Same, lateral.



Figs. 48–51. Pupae or pupal exuviae of *Lophodiplosis* spp. 48, *L. bidentata,* ventral. 49, Same, lateral. 50, *L. cornuata,* ventral. 51, Same, lateral.



Figs. 52–53. Pupal exuviae of *Lophodiplosis trifida*. 52, Ventral. 53, Same, lateral.

Paratypes.—All specimens from Queensland, Australia, and from blister galls or rosette bud galls on *Melaleuca* spp., deposited in ANIC except for one male and 2 pupal exuviae in USNM: ♂, same data as holotype (both from same lot as *L. indentata* and *L. denticulata*); 4♀, 2 pupal exuviae, blister galls on *M. dealbata,* Tully Heads Road #4, 16.9 km ESE Tully, 17-VII-1995, JKB, FSNQMd195135 (from same lot as *L. indentata*); ♂, 2 ♀, 2 pupal exuviae, from rosette galls on *M. quinquenervia,* Feluga site 1, 9.4 km E Tully, 18-VII-1995, JKB, FSNQMqn95139 (in same lot as *L. bidentata*).

Etymology.—The name *trifida* is Latin for three-cleft, with reference to the three-pointed projection of the pupal vertex.

Gall.—This species is presumably an inquiline and was reared from leaf blister galls with *L. indentata* and *L. denticulata* on *M. quinquenervia* and *M. dealbata,* and from bud rosette galls with *L. bidentata* on *M. quinquenervia.*

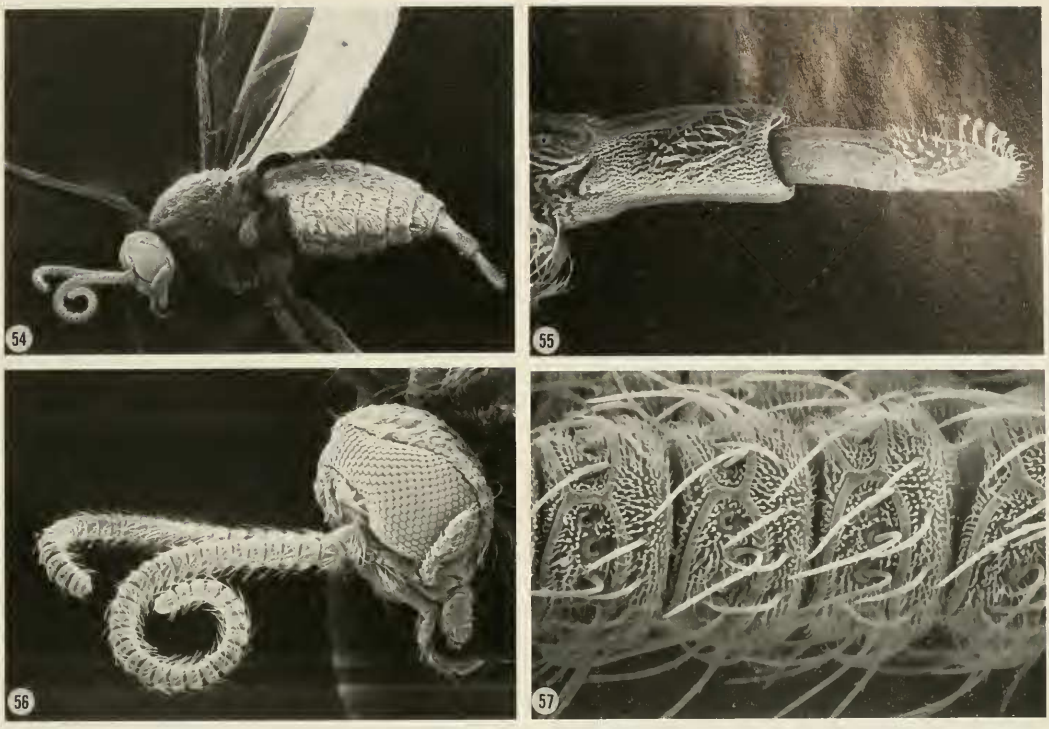
Remarks.—*Lophodiplosis trifida* is distinct from the other species of *Lophodiplosis* for the secondarily divided lobes of the male cerci, the deeply divided male hypoproct, and the large antennal and facial horns and long, three-cleft vertexal protuberance of the pupa.

Lasioptera uncinata Gagné, new species

Figs. 54–64

Adult.—Head (Fig. 56–57): Antenna with pedicel slightly wider than flagellomeres, first and second flagellomeres connate; male with 16–19 flagellomeres, slightly longer than wide; female (Fig. 57) with 31–33 flagellomeres, wider than long. Palpus 4 segmented. Labella elongate ovoid, with strong lateral setae.

Thorax: Wing (Fig. 58), 1.3–1.5 mm long; R_5 0.50–0.54 length of wing (n = 5).

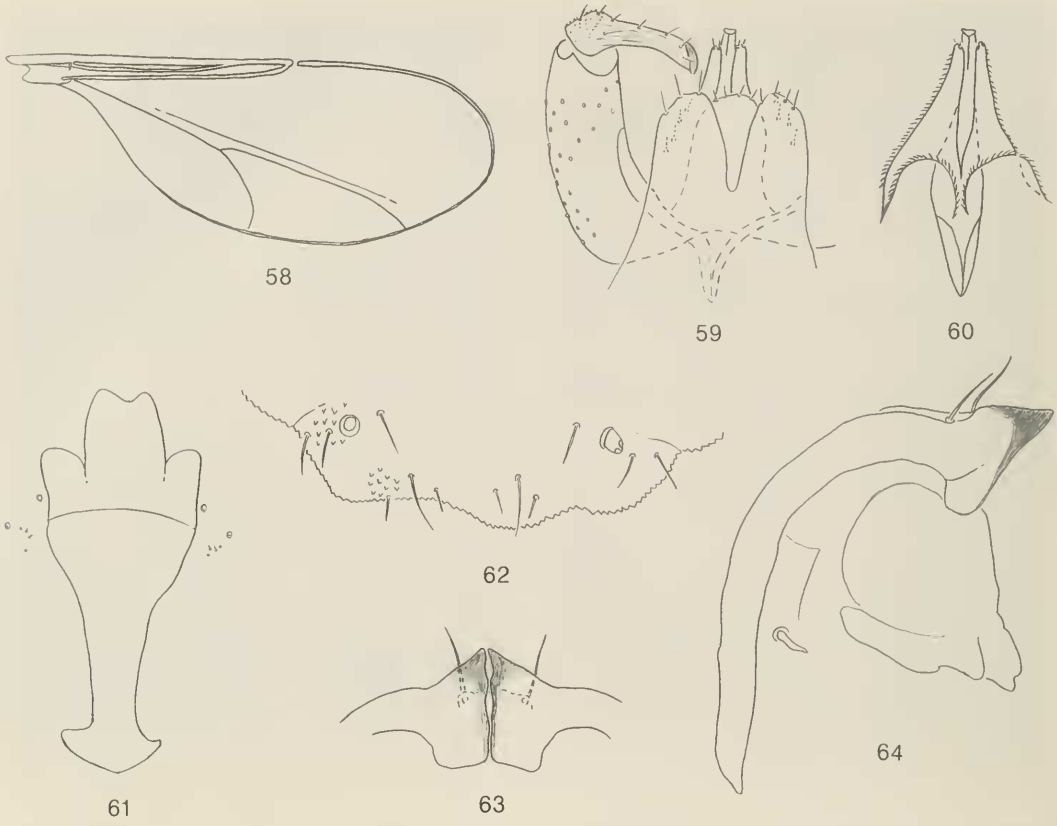


Figs. 54–57. *Lasioptera uncinata*. 54, Head, thorax, and abdomen. 55, Female postabdomen, eighth segment to end. 56, Head. 57, Part of flagellum.

Scutum with two lateral and two dorsocentral rows of setae, otherwise completely covered with scales; scutellum with group of setae on each side, elsewhere covered with scales; anepisternum with scales on dorsal two-thirds; mesepimeron with row of setae and covered with scales; katepisternum with scales in center. Tarsal claws with large basal tooth; empodia as long as claws; pulvilli about ⅔ as long as empodia.

Male abdomen: First through seventh sclerites rectangular with single, uninterrupted row of setae, a pair of anterior trichoid sensilla, and covered with scales; eighth tergite developed only on anterior half, without posterior sclerotization and setae, and otherwise as for preceding tergite except smaller. Genitalia (Figs. 59–60): gonocoxite cylindrical; gonostylus abrubtly tapered beyond base, setulose on bulbous base, ridged beyond; cerci convex posteriorly, with ventral and apical setae; hypoproct wide, convex posteriorly, with apical setae; parameres narrow and tapering beyond anterodorsal lobe; aedeagus narrow, as long as gonocoxite.

Female abdomen (Figs. 54–55): First through seventh tergites generally as for male but seventh somewhat smaller in extent; eighth tergum with 2 discrete, elongate sclerites, each with trichoid sensilla near anterior third and several setae posteriorly. Eighth segment with setation only on tergum; intersegmental membrane with lateral group of elbowed setae on each side, with no other setation; ninth segment and cerci about 4.25 times as long as sixth tergite, with setae only posteroventrally and posterolaterally; fused cerci with dorsolateral, glabrous, saddle-shaped area bearing wide, straight setae anteriorly and two posterodorsal rows of uncinate setae continuing to slightly hooked apex of cerci; remaining, setulose area of cerci with fine, thin ventral setae ventrally and thicker, curved, posterior setae.



Figs. 58–64. *Lasioptera uncinata.* 58, Wing. 59, Male genitalia, dorsal. 60, Parameres and aedeagus, dorsal. 61, Larval spatula and associated papillae. 62, Eighth and terminal segments of larva, dorsal. 63, Pupal antennal horns and vertex, ventral. 64, Pupal head and prothoracic spiracle, lateral.

Pupa (Figs. 63–64).—Vertex concave, the 2 setae elongate. Antennal bases pointed and bilaterally flattened apicoventrally. Face without prominences or setae.

Larva tentatively associated with this species (Figs. 61–62).—Spatula large, especially area anteriad of lateral papillae, tridentate anteriorly, the middle tooth the longest and notched. Sternal and ventral papillae of prothorax without setae; with a group of 4 lateral papillae on each side of spatulae, 2 of each group with short seta. Terminal segment with 3 pairs of papillae, setae of one pair twice as long as remaining two.

Holotype.—♀, from blister galls on *M. dealbata,* Australia, Queensland, 3 km N Cardwell, 31-VIII-1992, em. IX-1992, DWB, NQMdl92057, deposited in ANIC.

Paratypes.—All specimens from leaf blister or trumpet-shaped leaf galls on *Melaleuca* spp., Queensland, Australia, most deposited in ANIC, with representatives deposited in USNM: 2♂, from blister galls on *M. dealbata,* 3 km N Cardwell, 31 VIII-1992, em. IX-1992, DWB, NQMdl92057; 2♂ from blister galls *M. quinquenervia,* blister galls, Cardwell Swamp Site, 2 km SE Cardwell, 31-VIII-1992, emerged 14-IX-1992, ADM, FSNQMqn92056; ♂, blister galls, *M. quinquenervia,* Feluga Site 1, 31-VIII-1992, em. 3-IX-1992, Mqn920 59, ADM; 2♀, 4 pupal exuviae, from trumpet-shaped leaf galls, *M. viridiflora,* 16 km ESE Ingham, Forrest Beach School, 14-VIII-1995, JKB, FSNQMvr94153; 2♀, from trumpet-shaped leaf galls, *M. viridiflora,* Magnetic I., Townsville, 5-III-1995,

RJG; 2 larvae, from swollen stem, *M. leucadendra*, Oonoonba McPherson St., Townsville, 5-V-1994, L.M. Brown, 94049.

Etymology.—The name *uncinata* is Latin for "hooked," with reference to the hooked setae on the female cerci. These hooks are characteristic of all *Lasioptera* species except for a few species in which they are secondarily lost.

Gall.—This species may be an inquiline or a successor. The latter term is used for species that live in a gall after the gall maker has flown. At least one species of *Lasioptera* is known to have that habit (Yukawa and Haitsuka 1994). *Lasioptera uncinata* was reared from leaf blister galls of *Lophodiplosis indentata* on *M. quinquenervia* and *M. dealbata* and from trumpet leaf galls of *Lophodiplosis cornuata* on *M. viridiflora*.

Remarks.—The larva referred to this species is only tentatively placed here, but fits *Lasioptera* and most other Lasiopterini with its four papillae on each side of the spatula.

Two Australian species of *Lasioptera* were described earlier from *Melaleuca* and *Eucalyptus*. *Lasioptera nodosae* Skuse (1888:130) was based on a female bred from deformed buds of *Melaleuca nodosa* found in November by Masters in Homebush, NSW, and *Lasioptera miscella* Skuse (1890: 388) bred from malformed, coalescent leaf-stalks of *Eucalyptus haemastoma* in November and collected in Botany, NSW. Peter Kolesik of the University of Adelaide, who is undertaking a revision of the Skuse Cecidomyiidae, kindly compared a photo of the cerci of *L. uncinata* with those of females of both Skuse species and has determined for us that the hooked setae of the new species are distinct in the number and position from those of the other species.

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